



Software assisted assessment of likelihood ratios

Presenter(s) / Leader(s) / Moderator(s): Martin Lopatka, Jacob de Zoete, Annabel Bolck, Grzegorz Zadora, and Agnieszka Martyna

Target audience: Forensic practitioners interested in learning about the implementation and application of likelihood ratio calculations to forensic problems.

Maximal number of participants: 50

Minimum number of participants: 10

Duration of workshop: Morning and afternoon session.

This workshop will demonstrate the use of fit-for-purpose applications for calculating likelihood ratios in different forensic contexts. An introduction to the theoretical basis of likelihood ratios will prelude the hands-on portion, wherein participants will begin working with various tools for LR calculation.

The first practical section will begin with an introductory case of univariate and frequency-based features, for which LRs are easily calculated under a pair of source identity hypotheses.

The second portion of the workshop will focus on the exploration of continuous multivariate data intended for forensic interpretation. Special attention will be paid to assumptions of independence between features, data pre-processing, and feature selection strategies to ensure a stable and accurate LR model is achieved.

The third practical portion will introduce an application designed to rapidly evaluate different possible data processing work-flows for the calculation of score-based likelihood ratios. Performance metrics such as the log likelihood ratio cost, cross validation performance, and Tippet plotting will be introduced.

Throughout the workshop we will present a multitude of real examples from a variety of forensic domains including: illicit drugs, forensic ballistics, digital image forensics, speaker recognition, fibre analysis, glass analysis, car paints, polymers, and soil analysis (microbial and elemental). We will discuss the role of various software packages in use by forensic practitioners, for educational purposes, and as a legal aid to demonstrate the sensitivity of LR methods to parameter selection.

Finally, we will discuss the use of likelihood ratios as a tool for forensic intelligence and forensic data-mining tasks. Several data sets will be made available for participants in this workshop to explore the functionality of the tools presented in the workshop as well as the behaviour of LR systems when different reference collections and data treatment methods are employed.